WHAT IS CLAIMED IS:

1. A detection apparatus for use in a touch pad, for detecting the coordinates indicated by a user on the touch pad and the behavior of the user on the touch pad, the touch pad including an X-layer and a Y-layer, the X- and Y-layers being planar resistors, the detection apparatus having a sleep mode and an operative mode, wherein when the user touches the touch pad, the X- and Y-layers are electrically coupled at a touch point, the detection apparatus comprising:

a central processor for outputting at least a coordinate control signal, at least a conversion control signal and a wake-up control signal;

a coordinate detecting unit, coupled to a first terminal of the X-layer, a second terminal of the X-layer, a first terminal of the Y-layer, a second terminal of the Y-layer, and the central processor, for receiving the coordinate signal so as to determine an X-coordinate voltage and a Y-coordinate voltage, wherein the X- and Y-coordinate voltages correspond to the touch point;

an analog-to-digital converting unit, coupled to the coordinate detecting unit and the central processor, for receiving the conversion control signal so as to convert the X- and Y-coordinate voltages into an X-coordinate and a Y-coordinate, and to output the X- and Y-coordinate; and

a wake-up unit, coupled to the coordinate detecting unit and the central processor, wherein, as the detection apparatus is in the sleep mode, when the user

touches the touch pad and the X- and Y-layers are in contact with each other, the wake-up unit outputs a wake-up signal of a first level so that the detection apparatus changes from the sleep mode to the operative mode; the central processor sends the wake-up control signal so that the wake-up signal changes to a second level.

2. A detection apparatus according to claim 1, further comprising a power control unit, wherein the power control unit is coupled to the central processor, the coordinate detecting unit, and the analog-to-digital converting unit, and wherein:

when the detection apparatus changes from the operative mode to the sleep mode, the central processor sends a power control signal to the power control unit; in response to the power control signal, the power control unit outputs a power termination signal to stop a direct current (DC) voltage source from powering the coordinate detecting unit and the analog-to-digital converting unit.

3. A detection apparatus according to claim 2, wherein the wake-up unit comprises:

a wake-up capacitor, having a second terminal of the capacitor coupled to a ground;

a P-type transistor, wherein the emitter of the P-type transistor is coupled to one terminal of a first resistor, the base of the P-type transistor is coupled to a first terminal of the wake-up capacitor and one terminal of a second resistor, the first resistor has another terminal coupled to the DC voltage source, and another terminal

of the second resistor is coupled to the coordinate detecting unit;

a wake-up switch, coupled between the emitter of the P-type transistor and the ground, wherein the wake-up switch is switched on when the detection apparatus is in the operative mode, and the wake-up switch is switched off when the detection apparatus is in the sleep mode;

an N-type transistor, wherein the base of the N-type transistor is coupled to the collector of the P-type transistor, the collector of the N-type transistor is coupled to the DC voltage source, a third resistor is coupled between the emitter of the N-type transistor and the ground, the emitter of the N-type transistor is used as an output terminal for the wake-up unit to output the wake-up signal; and

an output capacitor coupled between the collector and emitter of the N-type transistor.

4. A detection apparatus according to claim 2, wherein the coordinate detecting unit comprises:

a Y power switch, one terminal of which is coupled to the DC voltage source, another terminal of which is coupled to the first terminal of the Y-layer and is used for selectively outputting the X-coordinate voltage, the Y power switch being controlled by a first coordinate control signal;

an X power switch, one terminal of which is coupled to the DC voltage source, another terminal of which is coupled to the first terminal of the X-layer and is used for

outputting the Y-coordinate voltage, the X power switch being controlled by a second coordinate control signal;

a Y grounded switch, coupled between the second terminal of the Y-layer and the ground, the Y grounded switch being controlled by a third coordinate control signal;

an X grounded switch, one terminal of which is coupled to the second terminal of the X-layer and the wake-up unit, another terminal of which is coupled to the ground, the X grounded switch being controlled by a fourth coordinate control signal;

wherein the coordinate detecting unit outputs the Y-coordinate voltage when both the Y power switch and the Y grounded switch are turned on and both the X power switch and the X grounded switch are turned off;

the coordinate detecting unit outputs the X-coordinate voltage when both the X power switch and the X grounded switch are turned on and both the Y power switch and the Y grounded switch are turned off; and

when the Y grounded switch, the Y power switch, and the X grounded switch are turned on, and the X power switch is turned off, it indicates that the user does not touch the touch pad if the Y-coordinate voltage is substantially equal to zero and if the first terminal of the Y-layer has a voltage of about zero after the Y power switch is turned off and the Y grounded switch, the X grounded switch, and the X power switch are turned on.

5. A detection apparatus according to claim 4, wherein the X power switch of the coordinate converting unit is coupled to the first terminal of the X-layer through a diode.

6. A detection apparatus according to claim 1, wherein the analog-to-digital converting unit comprises:

a reference voltage generator for outputting a reference voltage, wherein the reference voltage is a linear function of time;

a Y comparator having a Y positive input terminal and a Y negative input terminal, for comparing the Y-coordinate voltage and the reference voltage, wherein the Y positive input terminal is coupled to the first terminal of the X-layer to receive the Y-coordinate voltage, the Y negative input terminal is coupled to the reference voltage generator to receive the reference voltage, the Y comparator outputs a first voltage when the Y positive input terminal has a voltage larger than that of the Y negative input terminal, and the Y comparator outputs a second voltage when the Y positive input terminal has a voltage smaller than that of the Y negative input terminal;

an X comparator having an X positive input terminal and an X negative input terminal, for comparing the X-coordinate voltage and the reference voltage, wherein the X positive input terminal is coupled to the first terminal of the Y-layer to receive the X-coordinate voltage, the X negative input terminal is coupled to the reference voltage generator to receive the reference voltage, the X comparator outputs the first voltage when the X positive input terminal has a voltage larger than that of the X

negative input terminal, and the X comparator outputs the second voltage when the X positive input terminal has a voltage smaller than that of the X negative input terminal;

a compare switch, coupled to the X comparator and the Y comparator, the compare switch being controlled by the first conversion control signal; and

a timer, coupled to output terminals of the X and Y comparators, wherein the central processor causes the timer to begin clocking when the reference voltage generator begins outputting the reference voltage, the timer stops clocking and a measured time indicative of a relative digital coordinate is obtained when an output voltage from the comparator changes from the first voltage to the second voltage, the measured time indicates the Y-coordinate when the coordinate detecting device outputs the Y-coordinate voltage, and the measured time indicates the X-coordinate when the coordinate detecting device outputs the X-coordinate voltage.

7. A detection apparatus according to claim 6, wherein the reference voltage generator comprises:

a current source for providing a constant current;

a compare capacitor, wherein a first terminal of the compare capacitor is coupled to the current source, a second terminal of the compare capacitor is coupled to the ground, and the voltage at the first terminal of the compare capacitor is the output voltage of the reference voltage generator;

a charge switch coupled between the current source and the first terminal of the

compare capacitor and controlled by the second conversion control signal; and

a discharge switch coupled between the first terminal of the compare capacitor and the ground and controlled by the third conversion control signal.

8. A detection apparatus according to claim 1, wherein the central processor is a single chip controller.

9. A wake-up unit for a touch pad, for outputting a wake-up signal so that the touch pad changes from a sleep mode to an operative mode, the touch pad including an X-layer and a Y-layer, the X- and Y-layers being planar resistors, wherein the wake-up unit outputs the wake-up signal when a user touches the touch pad in the sleep mode, the wake-up unit comprising:

a wake-up capacitor, having a second terminal of the capacitor coupled to a ground;

a P-type transistor, wherein the emitter of the P-type transistor is coupled to one terminal of a first resistor, the base of the P-type transistor is coupled to a first terminal of the wake-up capacitor and one terminal of a second resistor, the first resistor has another terminal coupled to the DC voltage source, and another terminal of the second resistor is coupled to the coordinate detecting unit;

a wake-up switch, coupled between the emitter of the P-type transistor and the ground, wherein the wake-up is controlled by the wake-up control signal, wherein when the detection apparatus is in the operative mode, the wake-up switch is switched

on and the wake-up signal from the wake-up unit is at the second level, wherein when the detection apparatus is in the sleep mode, the wake-up switch is switched off and the wake-up signal from the wake-up unit is at the first level, and wherein the first level is indicative of a high level voltage and the second level is indicative of a low level voltage;

an N-type transistor, wherein the base of the N-type transistor is coupled to the collector of the P-type transistor, the collector of the N-type transistor is coupled to the DC voltage source, a third resistor is coupled between the emitter of the N-type transistor and the ground, the emitter of the N-type transistor is used as an output terminal for the wake-up unit to output the wake-up signal; and

an output capacitor coupled between the collector and emitter of the N-type transistor.

10. A wake-up unit according to claim 9, wherein the wake-up is coupled to the first terminal of the X-layer via a diode, so as to prevent current from following backwards to the X-layer.

11. A method of coordinates detection, for use in a detection device for a touch pad so as to detect coordinates indicated by a user on the touch pad, wherein the touch pad includes an X-layer and a Y-layer, the X- and Y-layers are planar resistors, the detection device includes a coordinate detecting unit and an analog-to-digital converting unit, the coordinate detecting unit includes a Y power switch, a Y grounded switch, an X power switch, and an X grounded switch, the Y power switch is coupled

between a direct current (DC) voltage source and a first terminal of the Y-layer, the first terminal of the Y-layer is an output terminal for the coordinate detecting unit to output an X-coordinate voltage , the X power switch is coupled between a direct current (DC) voltage source and a first terminal of the X-layer, the first terminal of the X-layer is an output terminal for the coordinate detecting unit to output a Y-coordinate voltage, the Y grounded switch is coupled between a second terminal of the Y-layer and a ground, the X grounded switch is coupled between the ground, and a second terminal of the X-layer and the wake-up unit, the analog-to-digital converting unit is coupled to the coordinate detecting unit and is used for converting the X- and Y-coordinate voltages, in analog form, into an X-coordinate and a Y-coordinate, in digital form, and for outputting the X- and Y-coordinates, wherein the method is performed so as to obtain the X- and Y-coordinates indicated by the user on the touch pad when the user touches the touch pad so that the X-layer are in contact with the Y-layer, the method comprising the steps of:

causing the Y grounded switch and the Y power switch to be turned on so that the first terminal of the X-layer outputs the Y-coordinate voltage;

feeding the Y-coordinate voltage into the analog-to-digital converting unit so that the analog-to-digital converting unit outputs the Y-coordinate;

causing the X grounded switch and the X power switch to be turned on so that the first terminal of the Y-layer outputs the X-coordinate voltage; and

feeding the X-coordinate voltage into the analog-to-digital converting unit so

that the analog-to-digital converting unit outputs the X-coordinate.

12. A detection method for use in a detection device for a touch pad so as to detect an action which a user performs on the touch pad by a touch point on the touch pad, the action being one of a set of actions including a movement, a click, a double click, and a drag motion, wherein the movement indicates that the user causes the touch point to move from one position to another position, the click, composed of a depression event and a release event, indicates that the user touches the touch pad for one time, the double click indicates that the user touches the touch pad for two times within an action time, the drag motion indicates that the user performs the click and then the movement within the action time, wherein the touch pad has a sleep mode and an operative mode, when the touch pad is in an initial state, the touch pad is configured to be in the sleep mode while k is set to one and D is set to zero, where k and D are positive integers, when the user touches the touch pad, the touch pad changes from the sleep mode to the operative mode, and when the touch pad is in the operative mode, the detection method comprising the steps of:

(a) determining whether the touch pad is touched; if so, proceeding to step (b); otherwise, proceeding to step (j);

(b) determining whether the touch pad is connected properly; if so, proceeding to step (c); otherwise, proceeding to step (h);

(c) determining whether k is greater than a predetermined number; if so, proceeding to step (d); otherwise, proceeding to step (f);

(d) determining whether D is equal to one; if so, proceeding to step (e); otherwise, proceeding to step (i);

(e) announcing that the action by the user is the drag motion; proceeding to step (f);

(f) waiting for a sampling time; proceeding to step (g);

(g) incrementing k by one; proceeding to step (a);

(h) setting k to one and D to zero; causing the touch pad to enter the sleep mode;

(i) announcing that the action is the movement; proceeding to step (f);

(j) determining whether k is greater than one and less than the predetermined number; if so, proceeding to step (k); otherwise, proceeding to step (h);

(k) determining whether D is equal to zero; if so, proceeding to step (l); otherwise, proceeding to step (m);

(l) announcing the depression event; setting k to one and D to one; proceeding to step (n);

(m) announcing that the action is the double click; proceeding to step (h);

(n) starting to clock and proceeding to step (o);

(o) determining whether the action time is reached; if so, proceeding to step (q); otherwise, proceeding to step (p);

(p) determining whether the user touches the touch pad; if so, proceeding to step (a); otherwise, proceeding to step (o); and

(q) announcing the release event; proceeding to step (h).

13. A detection method for use in a detection device for a touch pad so as to detect a movement which a user performs on the touch pad by a touch point on the touch pad, wherein the movement indicates that the user causes the touch point to move from one position to another position, wherein the touch pad has a sleep mode and an operative mode, when the touch pad is in an initial state, the touch pad is configured to be in the sleep mode while k is set to one and D is set to zero, where k and D are positive integers, when the user touches the touch pad, the touch pad changes from the sleep mode to the operative mode, and when the touch pad is in the operative mode, the detection method comprising the steps of:

(a) determining whether the touch pad is touched; if so, proceeding to step (b);

(b) determining whether the touch pad is connected properly; if so, proceeding to step (c); otherwise, proceeding to step (g);

(c) determining whether k is greater than a predetermined number; if so, proceeding to step (d); otherwise, proceeding to step (e);

(d) determining whether D is equal to one; if not, proceeding to step (h);

(e) waiting for a sampling time; proceeding to step (f);

(f) incrementing k by one; proceeding to step (a);

(g) setting k to one and D to zero; causing the touch pad to enter the sleep mode; and

(h) announcing that the movement is detected; proceeding to step (e);

14. A detection method for use in a detection device for a touch pad so as to detect a drag motion which a user performs on the touch pad by a touch point on the touch pad, wherein the drag motion indicates that the user performs a click and then a movement within an action time, the click, composed of a depression event and a release event, indicates that the user touches the touch pad for one time, and the movement indicates that the user causes the touch point to move from one position to another position, wherein the touch pad has a sleep mode and an operative mode, when the touch pad is in an initial state, the touch pad is configured to be in the sleep mode while k is set to one and D is set to zero, where k and D are positive integers, when the user touches the touch pad, the touch pad changes from the sleep mode to the operative mode, and when the touch pad is in the operative mode, the detection method comprising the steps of:

(a) determining whether the touch pad is touched; if so, proceeding to step (b); otherwise, proceeding to step (g);

(b) determining whether k is greater than a predetermined number; if so, proceeding to step (c); otherwise, proceeding to step (e);

(c) determining whether D is equal to one; if so, proceeding to step (d);

(d) announcing that the drag motion is detected; proceeding to step (e);

(e) waiting for a sampling time; proceeding to step (f);

(f) incrementing k by one; proceeding to step (a);

(g) determining whether k is greater than one and less than the predetermined number; if so, proceeding to step (h);

(h) determining whether D is equal to zero; if so, proceeding to step (i);

(i) announcing the depression event; setting k to one and D to one; proceeding to step (j);

(j) starting to clock and proceeding to step (k);

(k) determining whether the action time is reached; if so, proceeding to step (n); otherwise, proceeding to step (l);

(l) determining whether the user touches the touch pad; if so, proceeding to step (a); otherwise, proceeding to step (k); and

(n) announcing the release event.

15. A detection method according to claim 14, wherein, before said step (b), the method further comprises the step of:

determining whether the touch pad is connected properly; if so, proceeding to step (b); if not, setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

16. A detection method according to claim 14, wherein said step (g) further comprises the step of:

when it is determined that k is not greater than one or is not less than the predetermined number, determining whether the touch pad is connected properly; if so, proceeding to step (b); if not, setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

17. A detection method according to claim 14, wherein after said step (n) is performed, the method further comprises the step of:

determining whether the touch pad is connected properly; if so, proceeding to step (b); if not, setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

18. A detection method for use in a detection device for a touch pad so as to detect a double click which a user performs on the touch pad by a touch point on the

touch pad, wherein the double click indicates that the user touches the touch pad for two times within an action time, and the click, composed of a depression event and a release event, indicates that the user touches the touch pad for one time, wherein the touch pad has a sleep mode and an operative mode, when the touch pad is in an initial state, the touch pad is configured to be in the sleep mode while k is set to one and D is set to zero, where k and D are positive integers, when the user touches the touch pad, the touch pad changes from the sleep mode to the operative mode, and when the touch pad is in the operative mode, the detection method comprising the steps of:

(a) determining whether the touch pad is touched; if so, proceeding to step (b); otherwise, proceeding to step (c);

(b) determining whether the touch pad is connected properly;

(c) determining whether k is greater than one and less than the predetermined number; if so, proceeding to step (d);

(d) determining whether D is equal to zero; if so, proceeding to step (e); otherwise, proceeding to step (f);

(e) announcing the depression event; setting k to one and D to one; proceeding to step (g);

(f) announcing that the double click is detected and ending the method;

(g) starting to clock and proceeding to step (h);

(h) determining whether the action time is reached; if so, proceeding to step (j); otherwise, proceeding to step (i);

(i) determining whether the user touches the touch pad; if so, proceeding to step (a); otherwise, proceeding to step (h); and

(j) announcing the release event.

19. A detection method according to claim 18, wherein said step (b) further comprises the step of:

when the touch pad is not connected properly, setting k to one and D to zero and causing the touch pad to enter the sleep mode.

20. A detection method according to claim 18, wherein said step (c) further comprises the step of:

when it is determined that k is not greater than one or is not less than the predetermined number, setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

21. A detection method according to claim 18, wherein, in said step (f), after announcing that the double click is detected, the method further comprises the step of:

setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

22. A detection method according to claim 18, wherein, in said step (j), after announcing the release event, the method further comprises the step of:

setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

23. A detection method for use in a detection device for a touch pad so as to detect a click which a user performs on the touch pad by a touch point on the touch pad, wherein the click, composed of a depression event and a release event, indicates that the user touches the touch pad for one time, wherein the touch pad has a sleep mode and an operative mode, when the touch pad is in an initial state, the touch pad is configured to be in the sleep mode while k is set to one and D is set to zero, where k and D are positive integers, when the user touches the touch pad, the touch pad changes from the sleep mode to the operative mode, and when the touch pad is in the operative mode, the detection method comprising the steps of:

(a) determining whether the touch pad is touched; if so, proceeding to step (b); otherwise, proceeding to step (c);

(b) determining whether the touch pad is connected properly;

(c) determining whether k is greater than one and less than a predetermined number; if so, proceeding to step (d);

(d) determining whether D is equal to zero; if so, proceeding to step (e);

(e) announcing the depression event; setting k to one and D to one; proceeding to step (f);

(f) starting to clock and proceeding to step (g);

(g) determining whether the action time is reached; if so, proceeding to step (i); otherwise, proceeding to step (h);

(h) determining whether the user touches the touch pad; if so, proceeding to step (a); otherwise, proceeding to step (g); and

(i) announcing the release event.

24. A detection method according to claim 23, wherein said step (b) further comprises the step of:

when the touch pad is not connected properly, setting k to one and D to zero and causing the touch pad to enter the sleep mode.

25. A detection method according to claim 23, wherein said step (c) further comprises the step of:

when it is determined that k is not greater than one or is not less than the predetermined number, setting k to one and D to zero and causing the touch pad to enter the sleep mode.

26. A detection method according to claim 23, wherein, in said step (j), after

announcing the release event, the method further comprises the step of:

setting k to one and D to zero, and causing the touch pad to enter the sleep mode.

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